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SERIE: FISKERI · BIND X

NR. 3. Å. VEDEL TÅNING: YOUNG HERRING AND SPRAT IN FAROESE WATERS

KØBENHAVN
C. A. REITZELS FORLAG
BIANCO LUNOS BOGTRYKKERI A/S
1936

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YOUNG HERRING AND SPRAT IN FAROESE WATERS

BY

Å. VEDEL TÅNING

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INTRODUCTION

With a view to obtaining some knowledge of the occurrence of fry of the spring Herring at the Faroes, extensive pelagic investigations were made round the islands in 1934, three times in the course of April to July. In the following year also (March—April 1935), starting from the experience gained in 1934, an endeavour was made to collect material of the same kind, more especially of the tiny larvae. This material has been worked up in the present review together with other data regarding Clupeid fry collected in Faroese waters since 1924; in which year for the first time since the war the research-vessel had the opportunity of making pelagic collections at the Faroes.

In British waters we find 6 forms of Clupeids: Herring, *Clupea harengus* L., Sprat, *Clupea sprattus* L., Allis Shad, *Alosa alosa* (L.), Twaite Shad, *Alosa finta* (Cuvier), Pilchard, *Sardina pilchardus* (Walbaum) and Anchovy, *Engraulis encrasicholus* (L.); at Iceland there is only one form, the Herring, and at the Faroes we have only two, namely, Herring and Sprat. It is quite evident, that the determinative factor in the distribution is the temperature in the first place, though in the case of the Shads it is perhaps mainly the lack of suitable large rivers.

In the literature there are but few notes on the stock of Herring and Sprat at the Faroes; in fact, so far as known to me, the Sprat has not hitherto been mentioned from those islands. In the Zoological Museum at Copenhagen we have a single specimen of the Sprat (9 cm. long, no locality or date) noted as taken at the Faroes towards the end of last century; Schmidt makes no mention of it in his investigations with the "Thor" in Faroese waters during the years 1903—08; Hørring also (1902) does not mention it. So far as one can judge, the Sprat has become more abundant in certain fjords than formerly; there is even a small fishery now for Sprat. Possibly this seeming increase in quantity is connected with the somewhat higher temperature of the northern waters during recent years.

The racial peculiarities of the Faroese Herring were dealt with by Johansen (1919, pp. 12—13, pp. 47—48; 1921 a pp. 23—26, pp. 35—37; 1921 b, pp. 2—10); the most abundant form was found to spawn in spring whilst a form spawning in summer was less numerous (Johansen has also discussed the growth, age-composition etc. of the Faroese Herring). Lea (in Hjort 1910, pp. 18—20 and 127—138) described the age-composition in a few samples of young Herring from the Faroes. Wood (1935, pp. 14—15) has shown i. a. that the average number of vertebrae in samples of the spring Herring examined by him, is now lower than at the time when Johansen made his investigation. Larval stages were referred to by Johansen (1919, p. 12 and p. 48) and by Jespersen (1920, p. 10 and p. 22), from Trangisvaag and Vaag Fjord 1913; renewed investigation of some of these samples has shown, however, that the specimens

belong to the Sprat. R. S. Clark (1934, p. 23) mentions some interesting discoveries of Herring fry from the banks round the Faroes; these will be discussed further below, as they supplement in various ways the other material mentioned in this paper.

Collection and treatment of the material.

Pelagic investigations have been carried on at the Faroes since 1903, but divided over three periods, the years 1903—08, in 1913 and in the years 1924—35.

Schmidt did not find any Herring fry at the islands in 1903—08, when very intensive investigations were made of the pelagic fry of fishes in those waters from R/S "Thor". With the knowledge we now have of the spawning time of the Herring at the islands, it is very remarkable that Schmidt found no Herring fry in 1904 and 1905, when many stations were taken round the islands in the period from 7th to 22nd May 1904 and from 13th to 17th May 1905. The absence in those two years compared with the occurrence in the years 1931—35 might tempt one to think of an actual change in the occurrence of the Herring at the islands, then and now, but the available data have too many shortcomings to allow us to build very much on the difference. Schmidt's investigations at the islands also extended over July to September, but the chances of obtaining Herring fry during that period are but small, as they are by this time too large and active for the apparatus.

In 1913 the motor-schooner "Margrethe" made some pelagic hauls, especially in the Suderø area, and a number of Sprat fry were taken in the period 29/V to 20/VI in Trangisvaag and Vaag Fjord (see Jespersen 1920, p. 10).

Lastly, pelagic investigations were made in the fjords in the period 1924—32, especially in 1924—27 and 1931—32, also some pelagic hauls out on the banks and on the Faroe Bank; further, more extensive pelagic investigations out over the banks in July and late in August 1933 and especially in 1934, when the whole area as mentioned was investigated at three periods of the spring and early summer, namely (1) from 22/IV—6/V, (2) from 25—31/V and (3) from 4—12/VII (see charts Figs. 5—7, pp. 10—11). All these investigations were carried out by the R/S" Dana"; lastly, at the end of March and beginning of April 1935 some supplementary collections were made from one of the larger Faroese motor-boats, the "Louise" of Vaag (see chart, Fig. 8, p. 11).

In the lists pp. 24—28 details are given of the captures of both Herring and Sprat larvae during the years 1924—35. The 1913 material has already been discussed, as mentioned above. In the lists only those stations are noted, which gave positive results.

The collections were made by means of the 2 metre stramin-net in horizontal hauls, usually for either 15 or 30 minutes (the latter for some hauls in 1924—26); usually two nets were used at the same time, with about 15 and 65 metres wire out, thus probably fishing at a depth of about 5 and 20 metres below the surface. The material was preserved in 4 % formalin; the total length was measured in whole millimetres (to the lower whole mm.).

Separation of Herring and Sprat larvae.

The separation of the larval stages belonging to the different Clupeids occurring in European waters has been rendered possible by the long series of papers on the subject which

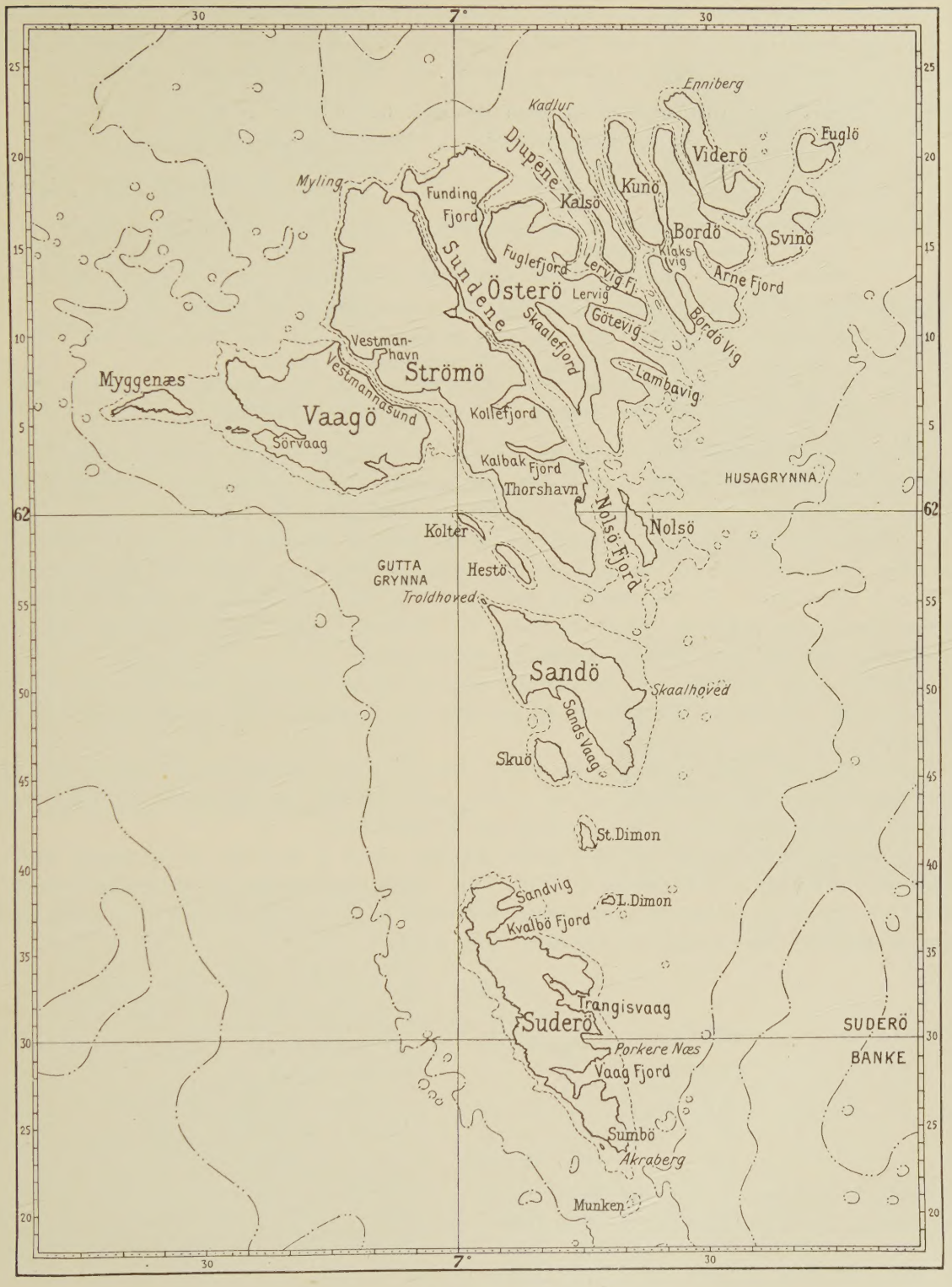


Fig. 1. Faroe Isls. Localities.

have appeared during the last 50 years. LEBOUR (1921, p. 455) gives an easily understood key, partly based on FAGE's work (1920), from which I may quote the portions of interest for work in the Faroese waters, where as noted only Herring and Sprat occur.

Young 8—10 mm. long. Distinguished by myotomes only (see however p. 8).

Total number in body	Number in trunk	
46—48	usually 37	..... Sprat
56—58	— 47	..... Herring

10—20 mm. Pelvic fins appear at 17.5—20 mm., some distance (4—5 myotomes) from pylorus, 35—37 myotomes in trunk ..... Sprat
Pelvic fins not appeared, 46—47 myotomes in trunk ..... Herring

20—40 mm. Pelvics situated behind the pylorus (on a level with in Pilchard).

1. Length of tail (i. e. from the anus to base of the tail fin) comprised well under 6 times in the total length, 31—35 myotomes in trunk ..... Sprat
2. Length of tail comprised more than 6 times in the total length, 41—46 myotomes in trunk. Pelvic fins situated 7—8 myotomes from pylorus..... Herring

The numbers given for the myomeres agree very closely with those found in the Faroese material; perhaps however, in accord with the slightly higher number of vertebrae in these more northerly waters, the number may be on an average about 1 higher.

The total number of vertebrae in the Faroese Herring is 55—59 for the spring spawners, 53—58 for the summer spawners, according to JOHANSEN and WOOD. In 13 specimens of Sprat I have found 47—49 vertebrae (47: 2, 48: 6, 49: 5) average 48.23, thus similar to average found, for example, by P. BJERKAN for Norway (Rapp. Proc.-Verbaux. 53, 1929, pp. 73—74), but higher than more southerly stocks show.

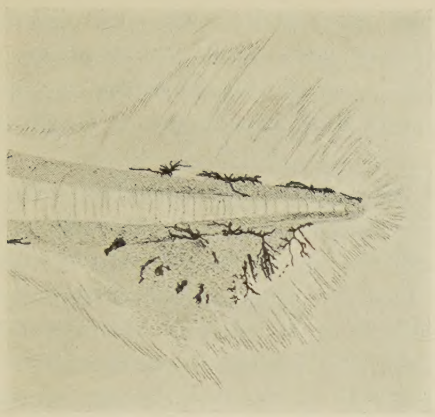
It is usually possible however, at any rate in this area, to separate Sprat and Herring fry of less than 10 mm. in length without counting the myomeres, by means of the following characters.

The Herring larva is usually ca. 6 mm. long or more on hatching, whereas the Sprat leaves the egg already at a length of ca. 3—3$^1/_2$ mm.; further, the latter on hatching has the eye quite unpigmented, where the Herring eye is pigmented.

EHRENBAUM (1905—09, p. 367) states that the Sprat is 3.6 mm. on hatching and that the eye is pigmented at a length of 4.7 mm. This occurs a little later in the Faroese form, as will be seen from the following summary of a sample of about 225 Sprat 3—7 mm. in length, taken in Sundene and Kollefjord on April 30th 1934.

Table 1.

Length mm.	No. and % with eye unpigmented		No. and % with eye pigmented	
7	..	..	16	100.0 %
6.5	..	..	13	100.0 -
6	..	..	17	100.0 -
5.5	11	19.6 %	45	80.4 -
5	49	64.5 -	27	35.5 -
4.5	28	100.0 -	..	..
4	17	100.0 -	..	..
3.5	7	100.0 -	..	..
3	1	100.0 -	..	..



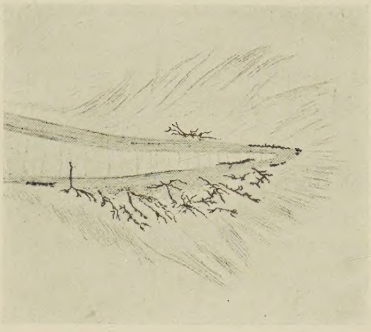
a

b

c

Fig. 2 a—c.

a



b

c

Fig. 3 a—c.

Fig. 2. Tip of tail of larval Herring.
a) 13.5 mm. St. 5155—65. Common type.
b) 13.3 mm. St. 5060—65. Rare type.
c) 13.8 mm. St. 5060—65. Rare type.

Fig. 3. Tip of tail of larval Sprat.
a) 10.2 mm. St. 5153—65. Common type.
b) 10.1 mm. St. 2285—50. Rare type.
c) 10 mm. St. 2285—50. Rare type.

P. Winther del.

It thus appears clearly, that pigmentation of the eye takes place between 5 and 6 mm. in Sprat larvae of the Faroes; this makes it easy to identify quite small Sprat larvae.

Further, the caudal pigment shows a distinct difference in the larvae of the two species of this area, which makes it easy to distinguish the larvae in most cases up to a length of ca. 20 mm. (Figs. 2—3).

Supracaudally towards the end of the notochord the Herring usually has 3—5 (most frequently 4) large or fairly large melanophores; rarely only 2, very rarely 6 or 1 (one exceptionally, as on very close examination an extra, very small adjacent melanophore may be found). Infracaudally we usually find the strong melanophores in the Herring close up to the ventral edge (Fig. 2). Even at a length of 20—25 mm. the above-mentioned supracaudal melanophores can usually be detected in the Herring larvae on close inspection.

In the Sprat, on the other hand, there is usually no trace of supracaudal melanophores; now and then one may notice a single speck out towards the end of the notochord either supracaudally or at the side, but its position is usually somewhat different from what is seen in the Herring; counting of the myomeres in these specimens alone will be a much quicker business than if one had to do that for the whole material of small stages. Among the many hundreds of specimens I have examined it is only very rarely that I have found 2 or even once 3 melanophores in the Sprat at this spot. The distribution of the pigment both supra- and infracaudally makes one suspicious however about such specimens, and one has then recourse to the myomeres to settle the matter (Fig. 3). I may remark in passing, that the larvae of the capelan (*Mallotus*) do not have the supracaudal melanophores seen in the Herring (see JESPERSEN 1920, p. 4); further, the remaining caudal pigment of this species is quite different from that of the Herring, the pigment over the gut is also quite different in position and it has about 70 myomeres, of which about 20 are postanal (Herring and Sprat have only about 10—12); larvae of the capelan are however very seldom found in Faroese waters, as a rule some older or larger specimens only, which have probably been carried from East Iceland.

I. Herring.

A. Review of records.

As noted above, SCHMIDT did not find any Herring larvae at the Faroes in the years 1903—08; nor were any found in 1913.

Investigations in the years 1924—27 and 1931—32 were mainly concerned with certain fjords, but a few scattered stations were also taken round the islands and on Faroe Bank. The latter however were mainly investigated in the months from July to September, thus a period when, according to our present knowledge, the Herring fry are so large that it is only exceptionally they are taken in the pelagic apparatus used. Even in May—June only a single Herring larva was taken at these outside stations. In 1933 the pelagic investigations round about on the banks were only carried out in the period between 25/VII and 1/IX, and only a single Herring larva was taken, on 26/VII, undoubtedly due to the fact just mentioned, that the larvae at this time are too large to be caught in the apparatus used. To clear up this question of the occurrence of Herring larvae at the islands, an earlier cruise to the area was made in 1934 and systematic work was carried on during the period 22/IV—6/V, again between 25—31/V

and lastly in the period 4—12/VII. The charts Figs. 5—7 indicate all the stations in the area investigated; at each station hauls with 15 m. and 65 m. wire were always made, sometimes also deeper hauls. The lists on p. 24—26 give a summary of the booty obtained, amounting to 836 specimens of Herring larvae.

In 1935 some stations both inside the fjords and out on the banks were investigated in the period 27/III to 1/IV by means of the large Faroese motor-boat "Louise". The chart Fig. 8 shows these stations and the results with regard to Herring larvae are detailed in the lists p. 26. This investigation yielded the important result, that spawning in the area east of Suderø must take place mainly close in towards the land, perhaps in the mouth of the fjords and bays opening to the east.

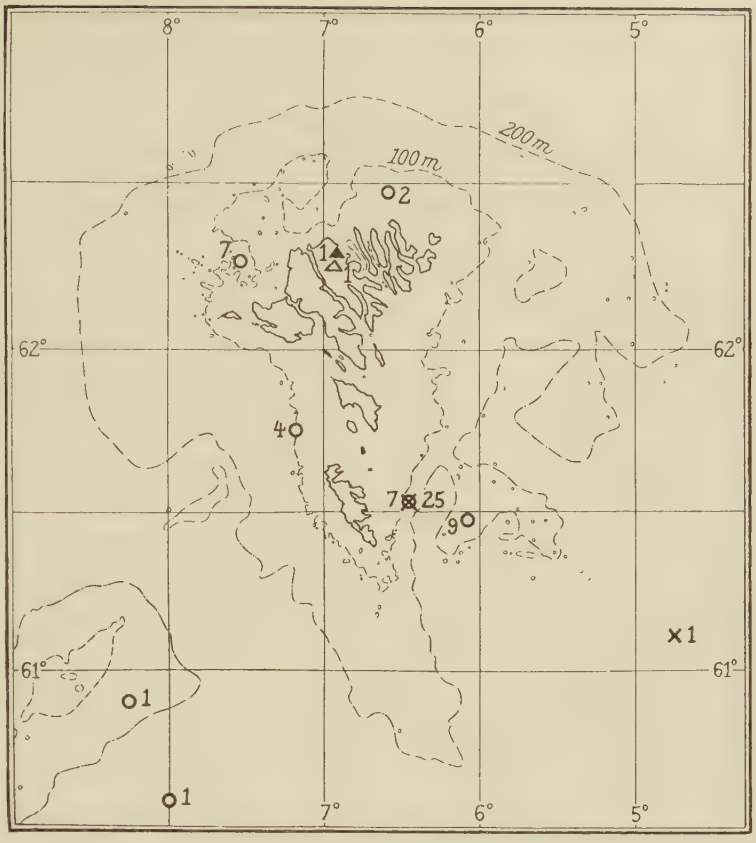


Fig. 4. Distribution of Herring fry. 1931—1933. "Explorer" 1931 ○; "Explorer" 1933 ×; "Dana" 1932 △; "Dana" 1933 ▲. No. per stat.

Clark (1934) has noted some discoveries of Herring fry at the Faroes, made by R/S "Explorer" in 1931 and 1933. The accompanying chart (Fig. 4) gives a view of the localities for this valuable addition to the scarce material so far available from the Faroes; it will be noticed, that the majority lie to the east of Suderø, just as in the case of the "Dana's" investigations. The isolated discoveries on and near the Faroe Bank (19 mm. larvae) as also south-east of Suderø (27 mm. larva) are for the moment difficult to account for[1]).

The following material is mentioned by Clark (l. c. p. 23):

Table 2.

Date	Length in mm.	*10*	11	12	13	14	*15*	16	17	18	19	*20*	21	22	23	24	*25*	26	27	28	29	*30*	Total
17-27/V	1931	—	—	3	6	12	20	3	2	—	2	—	—	—	—	—	—	1	—	—	—	—	49
10-11/VI	1933	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2	—	1	2	1	—	1	8

This material supplements the data collected by the "Dana" in a useful manner and I have included it in the following general discussion.

[1]) According to a report recently obtained from Dr. R. S. Clark isolated larvae were found in 1935 even farther to the south-east, from which he concludes that these scattered occurrences are of fry hatched out perhaps in the area of Flannan Island (N. W. Area admin. Rep., Rapp. Procès-Verb. 1936).

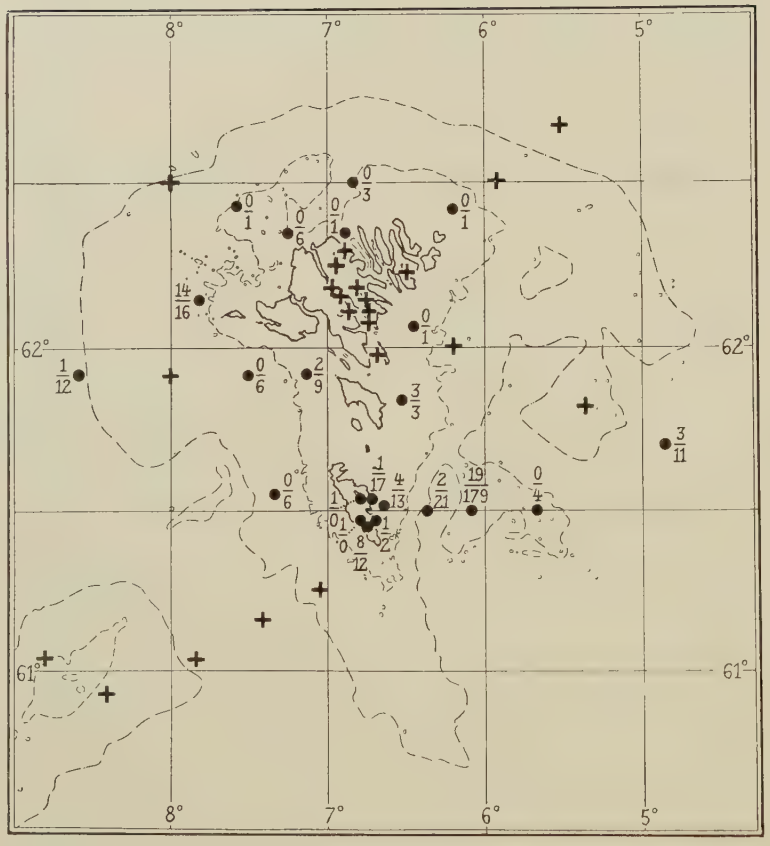


Fig. 5. Distribution of Herring fry. Cruise 1934, late April—early May. $\frac{3}{11}$ = number of larvae taken with 15 and 65 metres of wire respectively. + larvae not present.

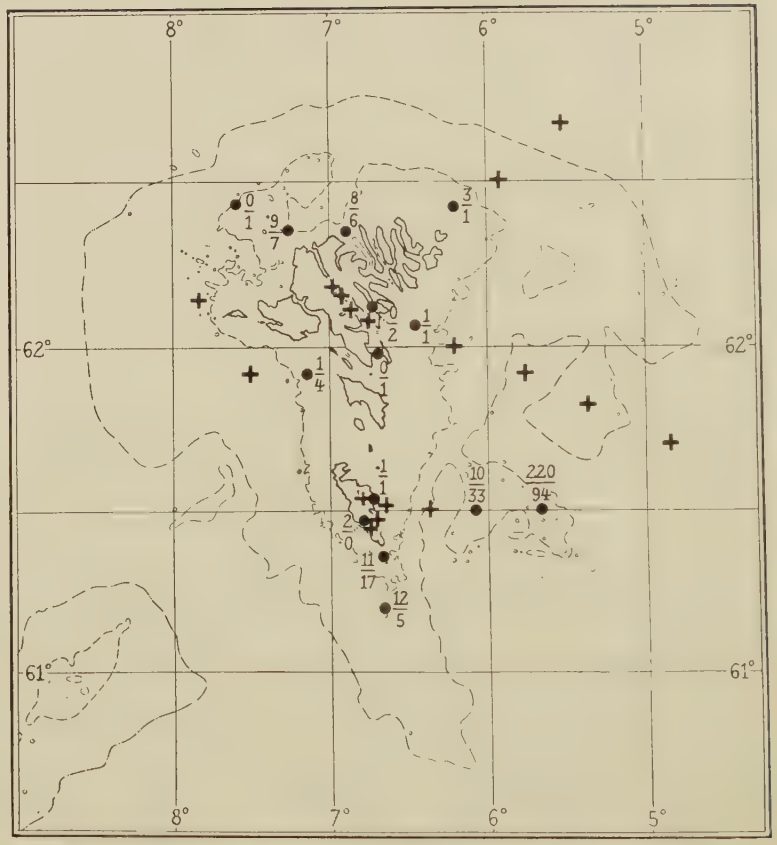


Fig. 6. Distribution of Herring fry. Cruise 1934, late May. (Cf. text fig. 5).

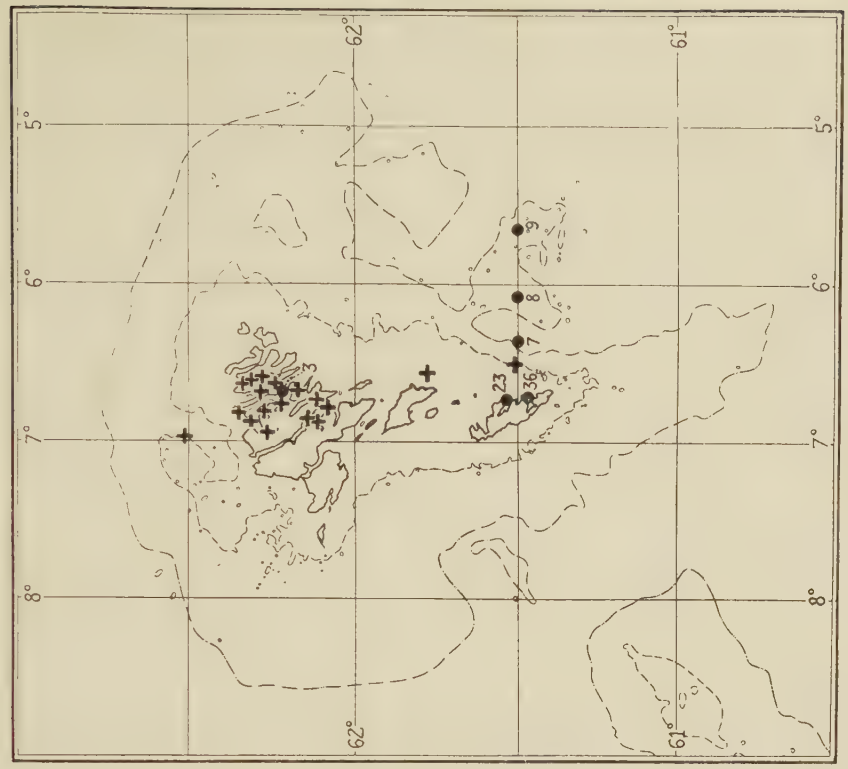


Fig. 8. Distribution of Herring fry. M/B "Louise", ca. April 1st 1935.

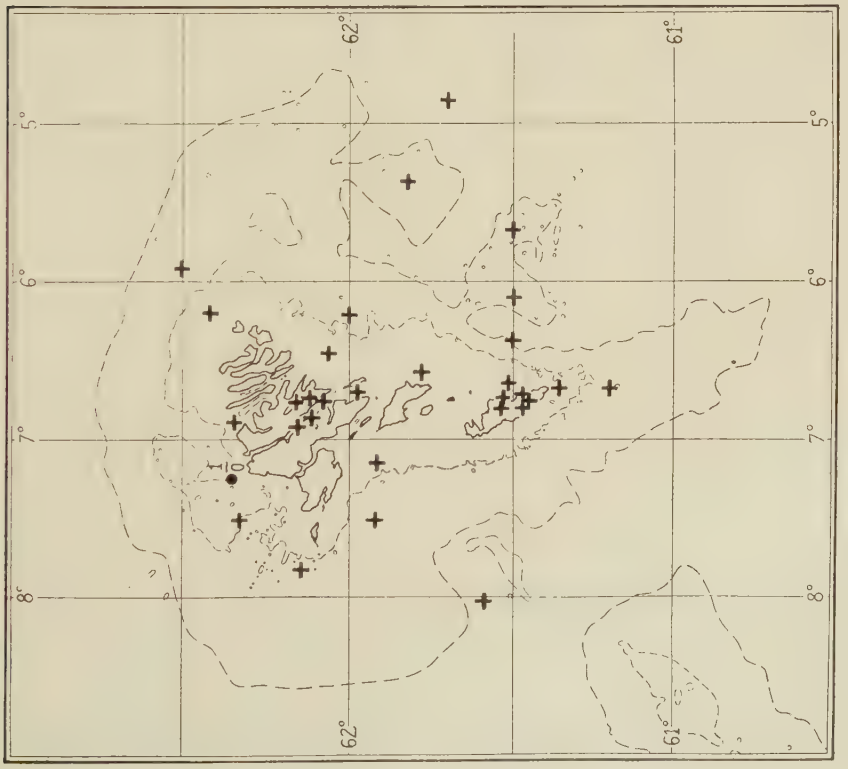


Fig. 7. Distribution of Herring fry. Cruise 1934, early July. (Cf. text. fig. 5).

B. Review of results.

1. Number of fry.

Examination of the charts and lists will show at once what small numbers of Herring fry have been taken at the Faroes, only 924 specimens in all, plus 57 taken by the "Explorer"; the greatest haul of 15 minutes with the 2 m. stramin net has only given 220, the majority far less, usually only 1—25 specimens, whilst only 5 out of 66 positive hauls have yielded anything over that.

Considering only the two years 1934 and 1935, which have yielded most of the material, we obtain the following summary of the numbers per positive net (i. e. hauls yielding any Herring fry at all):

Table 3.

Year	No. of + nets	No. of Herring fry	per + net (15 mins.)
1934	58	836	14.4
1935	6	86	14.3
1934—35	64	922	14.4

Compared with catches elsewhere, for example in Scottish waters, the North Sea and in Iceland waters, the quantities of fry taken at the Faroes are very small. Taking the positive hauls with the 2 m. stramin net and calculating the catch per hour, the result for the years 1932—35 is only 56 Herring larvae per hour at the Faroes, with 880 as the maximum figure; but for the North Sea and Channel Wallace (1924) gives records which show an average catch per whole hour of ca. 560 specimens in Sept.—April, whilst up to 33,603 larvae have been taken there, calculated per whole hour (29. January 1923). And for Iceland (all material 1903—1934): April—June 169, July—September 754 Herring larvae calculated per whole hour, with the highest numbers 4,395 and 24,028 per hour in spring and summer respectively. Lastly, it would seem from various facts, that there must be great fluctuations in the production of fry from time to time in the Faroese waters; otherwise it is difficult to understand, why Schmidt found no sign of the larvae in this area in 1904—05 (cf. p. 4).

2. Spawning period.

As mentioned above, race analyses of adult Herring from the Faroes by Johansen have shown both a spring and a summer spawning Herring; for the former Johansen notes for the spawning time "probably in the main March—April" (1921, p. 7). Later, however, ripe spring Herring were also found ca. 15/V (Vaag Fjord 1932) and by the "Dana" 24/V (Fundingfjord 1926). Summer spawners, ripe or almost ripe Herring have been found at the islands themselves, for example on 16/VIII in Skaalefjord (1919) and between 23 and 30/VIII in Sundene, Skaalefjord and Fuglefjord (1927). On 18/VI 1902 Hjort with the "Michael Sars" took some Herring northeast of the Faroes, one of which was ripe (Norges Fiskerier I. Bergen 1915, p. 199); this differs widely in time from other discoveries at the Faroes, but appears to agree with the summer Herring which spawns at south-east Iceland. If it were the rule for

the summer Herring at the Faroes to deposit its eggs in June—July, we ought to have found the tiny fry in our numerous investigations, just in July—September, but this has never happened.

On the basis of adult ripe Herring the spawning periods may thus probably be delimited as follows:

1. spring Herring: (February?)—March—April—May,
2. summer Herring: August—September.

So far as the spring Herring is concerned, this is confirmed by a study of the occurrence of the larvae, as will be seen from the following summary of the whole larval material from 1931—35; though it will be evident, that the principal spawning must have taken place in the first half of March in the years mentioned, to judge from the occurrence of larvae less than 10 mm. in length. How far any spawning may occur in February, is not yet known.

Table 4. Number of Herring fry in each month (1931—35).

	Feb.	March[1])	April	May	June	July	Aug.	Sept.[2])
Total No. of larvae	—	83	83	804	9	2	0	?
Larvae < 10 mm.	—	43	22	16	0	0	0	?
— — — %	—	51.8	25.3	2.0	0	0	0	?

[1]) 27.—28. March. [2]) No investigations later than Sept. 4th.

Table 7 on page 15 gives further details and shows, among other things, that hatching has obviously come to an end almost entirely some time in May. It may be remarked that investigations of greater extent than those made hitherto, in March and in early April (thus at the beginning of the spawning period), would undoubtedly have yielded abundant quantities of the earliest stages, which at present, as will be seen from the following summary, are far too feebly represented relative, for example, to the 10—14 mm. sizes.

Table 5. No. of fry in different size categories (1931—35).

Size in mm.....	< 10	10—14	15—19	20—24	> 25	Total
Number	81	670	181	27	9	968[1])
%.....	8.4	69.2	18.7	2.8	0.9	100

[1]) + 13 of doubtful length.

Regarding the spawning period of the summer Herring nothing can be added to what has been said above, since no pelagic investigations were made so late in September, that newly hatched larvae could be expected in the catches.

3. Vertical distribution of fry.

At most of the Faroese stations, as already mentioned, the nets were mostly used with 15 and 65 metres out (other lengths, as 20 and 40 m., also used very occasionally). If we had fished lower down near the bottom, we should possibly have obtained many more of the youngest stages, but the danger of losing the apparatus when fishing near the bottom, where this is so

uneven as at the Faroes, is distinctly great; in the following brief summary the material for the years 1931—35 shows, that the tiny larvae less than 10 mm. in length were mostly taken at the deeper depths.

Table 6.

Metres wire out.....	10—20 m. w.	40—65 m. w.
Total No. of larvae...	344	580
No. < 10 mm.	6	75
— — %.....	1.7	12.9

Estimating the catch per hour, we find that slightly more were taken in the deeper than in the upper layers, namely 61 specimens per hour against 49 (all lengths considered).

4. Horizontal distribution of the fry.

a. Distribution of fry < 10 mm.

The smallest stages are of special value in determining the locality where the Herring lay their eggs. Even though the currents are powerful and often rapid in the Faroese area, the maximum of the tiny fry may be taken as nearest the place where the Herring has spawned in greatest quantity.

Fig. 9. Distribution of Herring larvae smaller than 10 mm. All material, March—April—May.

The accompanying chart (Fig. 9) shows the number of larvae < 10 mm. taken at the different stations round the islands. We see from it, that by far the most were taken on the east side of Suderø and out over the banks there; late in March especially the pelagic nets have contained not a few of such tiny fry. How far the occurrences out over Suderø Bank and still farther to the north-east have come from spawning near Suderø itself or out on the bank (where the depth however goes down to about 190 m.), cannot be determined at present. Current bottles thrown out at the different places late in March where fishing was carried on, seem to indicate that the current has carried these stages out from the coastal areas (see later p. 17).

There is also undoubtedly some spawning at other places near the islands, but obviously to a small extent; the water-masses circulating about the islands may indeed easily have carried many of the small fry, taken at the northern islands, from the Suderø area. At the north islands 69 larvae in all were taken during the principal spawning period March—April, and of these only 10 or 14.5 % were under 10 mm.; in the Suderø area, on the other hand, 96 specimens of the larvae were taken in this period and of these no fewer than 55, or 57.3 % were below 10 mm. (see Table 7). More precise investigations must be made, however, to determine exactly where the spawning places lie, both in the northern and southern areas.

b. Distribution of all fry.

The southern area shows not only most larvae < 10 mm. but, as will be seen from the following Table, also an absolute majority over the whole material of specimens (see also the charts Figs. 4—8); we have altogether 838 larvae from the southern area against only 143 from the northern.

Table 7. Distribution of all material of Herring fry, according to areas, months and size-categories.

Northern Islands (N. of 61°45′ N. Lat.).

mm.	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	47	Average size	Total number
Late March	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
April	—	—	—	2	8	14	28	12	3	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10.87	69
Early May.	—	—	—	—	2	—	2	4	2	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(12.08)	13
Late May .	—	—	1	—	—	—	—	3	2	3	10	7	8	9	6	5	3	—	1	—	—	—	—	—	—	—	—	—	—	16.74	58
June	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	(26.0)	1
July.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	(39.5)	2
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Suderø Area (S. of 61°45′ N. Lat.).

mm.	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	?	Average size	Total number
Late March	—	—	3	19	21	22	10	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	9.46	82+1
April	—	—	—	—	12	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(9.14)	14
Early May.	—	—	—	—	12	50	90	86	44	8	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11.44	291
Late May .	—	—	—	—	1	6	18	54	105	92	56	36	16	15	15	7	7	1	—	—	—	1	—	—	—	—	—	—	12	14.29	430+12
June	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2	—	—	1	2	1	—	1	—	—	—	(26.13)	8
July	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
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As mentioned, many of the larvae taken in the northern area have undoubtedly been carried there by the currents; in accordance with this it may be noted, that no fewer than ca. 38 % of all the larvae taken in the northern area are greater than 15 mm., whilst only ca. 20 % are above that length in the southern area.

c. Distribution of fry according to depth.

In the Faroese waters the larvae will be quickly carried out over much greater depths than at the places where the eggs were spawned. Consideration of the distribution of the tiny fry in relation to depth may nevertheless possibly yield some information regarding where, at least the majority have been hatched. The following Table illustrates this point and shows, that the great mass at any rate of the present material of larvae have come from within the 50 metre line, which means at the Faroes quite close to land.

Table 8. Distribution of fry according to depth of locality.

Depth in m.	Total no. of larvae	Larvae < 10 mm.	% of small larvae
< 50	104	36	*34.6*
50— 75	59	4	*6.8*
75—150	128	10	*7.8*
150—240	633	32	*5.1*

Summing up the points discussed in the foregoing we may say, that the spring Herring at the Faroes has spawned mainly in the Suderø area in the years 1931—35 and that the spawning undoubtedly has taken place for the most part within the 50 metre line along the east side of Suderø, perhaps at the mouths of the more or less sheltered fjords and bays occurring there.

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5. Temperature and salinity at the spawning places.

According to available data the temperature in spring at the spawning time of the Herring, that is, in the months of March to May, perhaps beginning slightly late in February but chiefly in March, lies about 5°—7° C. The distribution of the temperature in the surface waters at the northern islands can be seen from the curve Fig. 10; it may be said here, that excluding the summer months this curve may be considered fairly representative for the whole of the water-masses round the islands within the 100 m. line, the mean temperature for any other, arbitrarily chosen locality and depth hardly differing much more than ± 0.5° from the temperature shown in the curve. Further, it may be said that the temperature at Suderø is on the whole slightly higher than at the northern islands, from which the curve temperatures originate; this is the reason possibly, why the Herring preferably spawn at Suderø in the spring months. As an example of the temperature conditions in the sea during the spawning time of the Herring it may be mentioned, that the temperature east of Suderø (mouth of Trangisvaag)

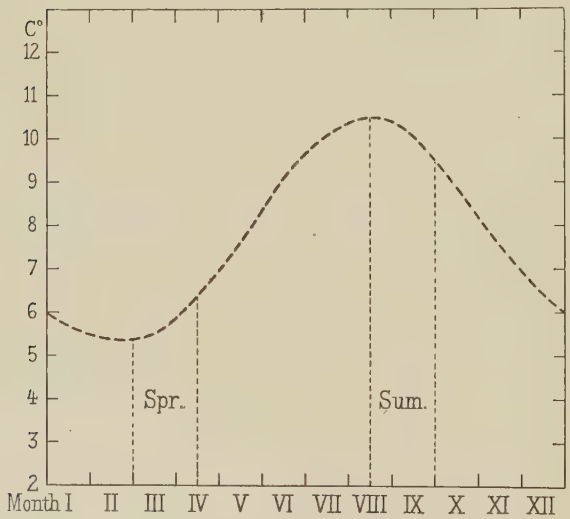

Fig. 10. Average surface temperatures at the Faroes, Northern Isls. (Thorshavn 1876—1915). Spr. and Sum. = supposed principal spawning time of the spring- and summer-spawning Herring.

on March 28th 1935 was 6.80° C. at the bottom (depth 70 m.), out on Suderø Bank at the same period 6.74° C. (depth 180 m.), whilst north of the Faroes it was 6.53° C. (depth 120 m.).

The salinity is very uniform in the water-masses round the Faroes: 35.15—35.35 $^0/_{00}$; the surface water inside the fjords and at the mouths may have a somewhat lower salinity, below 35.0 $^0/_{00}$ and down to a little over 34 $^0/_{00}$, owing to the freshwater descending from the land.

Since we know too little as yet about the spawning period and localities of the summer Herring, I shall not discuss the temperature and salinity conditions at this time of year; however, the curve Fig. 10 also shows the approximate temperature during the spawning period of the summer race.

6. Drift of the fry away from the Faroe area.

In 1935 current bottles were thrown overboard at three stations, where Herring were taken, east of Suderø and on Suderø Bank (see chart Fig. 8). About 25 $^0/_0$ of these have been recovered, from the Orkneys, Shetlands, Tampen Bank and Norway; from the westernmost of the stations a couple of bottles have reached the east side of the Shetlands in 54 days. In a direct line to the Shetlands this would mean a distance of about 150 miles, but the bottles have certainly travelled considerably more, perhaps about 300 miles (cf. Tait's chart, Rapp. Proc.-Verb. 89 III, p. 68). Hence, reckoning upon a drift of at least 4 miles and perhaps up to 6—7 miles in the day, we may well consider, that the Herring larvae taken out over Suderø Bank and even farther out in the Faroe-Shetlands Channel (about 60 miles from land) have come from a spawning close to the coast of Suderø, for example, as these had all grown $2^1/_2$—4 mm. or more since hatching and thus presumably had lived at least 10 days. In this time the current could easily have carried them 50 miles away from the place of hatching. Both the "Explorer" and "Dana" as well as the "Louise" have taken even fairly large numbers of fry far out to sea from the Faroes (see charts Figs. 4, 5, 6 & 8) and these have undoubtedly been hatched out near the islands themselves. If the drift of fry away from the area is really so great as these discoveries make out, then we can understand how the local Faroese stock of Herring, which spawns outside the fjord areas, will always remain of small importance for the fishery.

7. Rate of growth.

The material is too meagre to provide an exhaustive survey of the growth of the fry at the Faroes. As will be seen from the summary below of the whole material, we only have a fairly large material for the first and latter half of May, whereas from the main hatching period itself (March) and from June—July we have still far too little data. We must add moreover, that the above-mentioned drift of fry from the area steadily carries the larger and largest fry away and thus presumably keeps the average length artificially too low. It should be emphasized also, that during the lightest period of the year it is certainly difficult to catch any of the larger fry in the pelagic apparatus used.

Table 9. Average size of Herring fry from the Faroe Area.

Month	Number	Average size in mm.
late March	82	9.46
April	83	10.58
early May	304	11.47
late May	488	14.58
June	9	26.11
July	2	39.50

II. Sprat.

A. Review of records.

It is fairly certain that the material discussed by Johansen and Jespersen from Trangisvaag and Vaag Fjord for 29 V – 20 VI 1913, consisted exclusively of Sprat fry: the specimens are stated to have been 8—15 mm. in length (average ca. 10—11 mm.) and the samples preserved contain only Sprat larvae. The material was fairly large, 405 specimens, taken in 12 hauls of 30 minutes each, thus 67.5 specimens per hour.

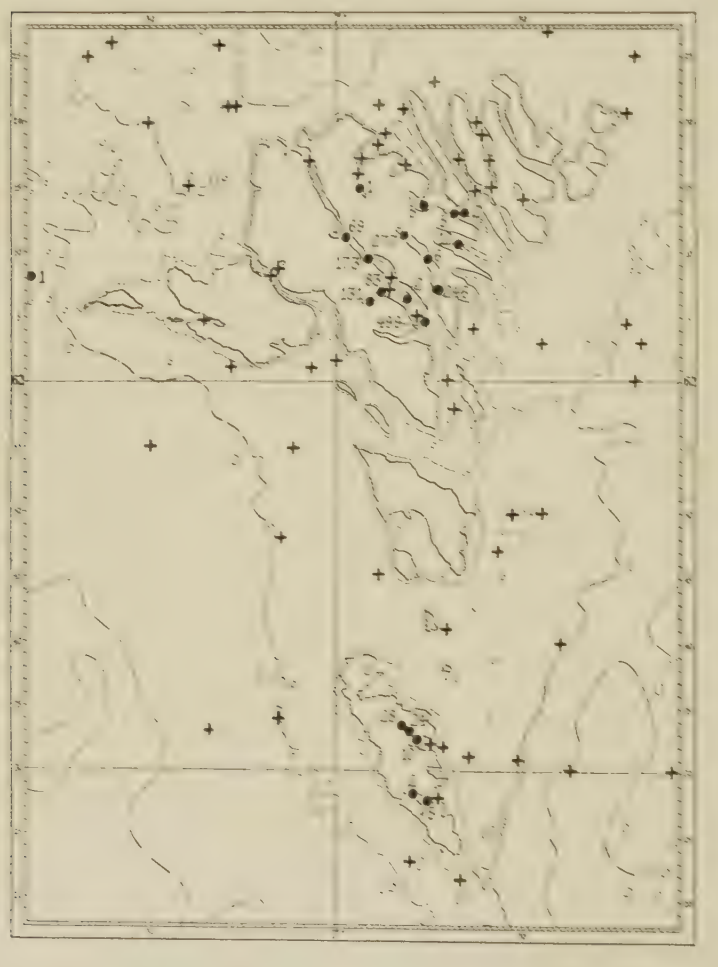

Fig. 11. Distribution of Sprat larvae. All material. • larval stages present. + not present.

The present material, taken by the "Dana" in the years 1924—27 and 1931—34 and by the M B "Louise" in 1935, contains altogether 1581 specimens.

Each year during most of the "Dana's" visits series of stations were investigated through the various fjords, Trangisvaag and Vaag Fjord in Sudero and Skaalefjord, Sundene, Kollefjord and Fundingfjord in the north islands; hauls were also made in other fjords and sounds. It is unnecessary to give here a list of all the stations taken at the islands, as with the exception of a single specimen taken west of Myggenæs all the Sprat fry were obtained in the following fjords only: Trangisvaag and Vaag Fjord, Sundene, Kollefjord, Skaalefjord, Fundingfjord, Götevig, Lervig Fjord and Fuglefjord. These positive localities and the negative stations in 1924—35 are noted on the chart Fig.

11; as a rule several hauls have been made at each station in various months and years. As will be seen from the chart, it is possible that some other fjords and bays at the Faroes also house the Sprat, all fjords and bays not being included in the investigations.

Since one might expect to find the Sprat fry throughout almost the whole period (March to September) when investigations were made at the Faroes, small quantities certainly in summer and late summer and March perhaps excepted, it will be unnecessary to note in detail here when the various places were visited; besides, the lists for both Sprat and Herring fry pp. 24—28 afford quite a lot of information on this point.

B. Review of results.

1. Number of fry.

As mentioned above, only 1581 specimens altogether were taken in the years 1924—35; the largest haul was of 362, taken in half an hour in Skaalefjord (thus 724 for one whole hour), but the majority of the hauls yielded much less. Altogether 59 positive hauls were made; in the first years some of the hauls were of half an hour's duration; in the later years a quarter, and the average catch per whole hour works out at 71 specimens, which is a little more than the corresponding result for the Herring (56).

2. Spawning period.

The earliest running ripe Sprat obtained were found in Kollefjord in early April. The occurrence of the fry, especially of the earliest, is in agreement with this, as will be seen from the following Table; in April over 80 % of the whole material consisted of the tiny stages below 7 mm. in length. The earliest larva was taken on the 1st of April.

The spawning of the Sprat thus begins in March and reaches its maximum apparently in April; this is in contrast to the conditions in the North Sea, for example, where the maximum seems to be in June. In the enclosed waters of the west coast of Norway, however, Sund (1911, p. 39) has found a similar early spawning as at the Faroes.

Table 10. Number of Sprat fry in each month (1924—35).

	Feb.	March	April	May	June	July	Aug.	Sept.
Total No. of larvae	—	?	285	1221	5	8	13	33
Larvae < 7 mm.	—	?	235	589	0	0	1	0
" %	—	?	82.5	48.2	0	0	(7.7)	0

Apparently, as at other places, there may be a little spawning also late in the summer; from Vaag Fjord (19/VIII) we have some few specimens smaller than 15 mm., one of these only 7 mm.

As will be seen from the following Table also, the material is well suited to determine the beginning of the spawning time, somewhat more than half of the fry being quite small, < 7 mm.

Table 11. No. of fry in different size-categories.

Size in mm	< 7	7—10	10—14	15—19	20—24	> 25	Total
Number	825	496	189	16	23	16	1565[1])
%	52.1	31.7	12.1	1.0	1.5	1.0	99.4

[1]) + 16 of uncertain length.

3. Vertical distribution of fry.

Investigation of the depth at which the small stages < 7 mm. were chiefly taken, gives the following result:

Table 12. Vertical distribution.

Metres wire out	10—20 m. w.	40—65 m. w.
Total number of larvae	683	898
Number of larvae < 7 mm.	392	433
%	57.4	48.2

This shows that the tiny Sprat fry are almost uniformly distributed in the water-masses fished through, though most in the uppermost layers, thus the opposite to Herring fry; this of course is natural enough, as the Sprat eggs are pelagic, the Herring eggs demersal. Recalculated to hauls of one hour, the material indicates that most larvae (taking all sizes together) were obtained in the deepest layers, namely 115 specimens per whole hour, against 48 in the upper layers.

4. Horizontal distribution of fry.

a. Distribution of all sizes of larval stages.

Both the tiny and older larvae were only taken, practically speaking, inside the fjords, and practically no drift from there out over the banks is apparent; at any rate no fry have so far been taken out there (only 1 specimen off Myggenæs).

Kollefjord, Sundene and Skaalefjord, a continuous chain of fjords and sounds, seem to house most Sprat at the northern islands (Table 13) and small quantities of adults are fished commercially here. The fjords of Suderø, which are slightly warmer than those of the northern isles, now appear to have a very small stock, numerous fishery investigations during the last ten years having yielded 69 specimens in all, practically speaking no more than the average taken per hour's haul in 1913 (67.5 specimens). This points unquestionably to some change in the conditions, but the slight alteration of the temperature which has possibly taken place, seems far too slight to provide a cause; the matter must be closely followed in the future.

Table 13. Distribution of Sprat fry according to areas, months and size-categories.

Northern Isles (North of 61°45′ N.).

mm.	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	?	Average size	Total number
April	8	53	139	35	31	14	3	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	5.32	292
May	2	56	226	299	207	131	102	82	41	29	13	8	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9	7.09	1207
June	—	—	—	—	—	—	—	—	—	1	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(13.33)	3
July	—	—	—	—	—	—	—	—	—	—	—	—	—	2	1	2	1	—	1	—	—	—	—	—	—	—	—	—	—	—	(17.86)	7
Aug.	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	(18.00)	3
Sept.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
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Suderø (South of 61°45′ N.).

mm.	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	?	Average size	Total number
April	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
May	1	—	5	—	3	3	2	3	1	1	1	1	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8.87	23
June	—	—	—	—	—	—	—	—	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(12.50)	2
July	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	(20.0)	1
Aug.	—	—	—	1	—	—	—	—	1	—	—	1	—	—	2	1	1	2	—	1	—	—	—	—	—	—	—	—	—	—	(16.40)	10
Sept.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	3	5	8	4	3	3	4	1	—	1	—	25.12	33
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The chart Fig. 11 also shows, where the Sprat fry were taken in the fjords.

b. Distribution of the fry according to depth.

As the Sprat spawns pelagically, in contrast to the Herring, the depth at the place has little or no influence on the occurrence of the fry; this is seen clearly in the following Table, which shows that the tiny fry are uniformly distributed out over the surface of the fjords.

Table 14. Distribution of fry according to depth of locality.

Depth in metres....	Total no. of larvae	Larvae < 10 mm.	% of small larvae
< 25	164	76	*46.3*
25— 50	637	360	*56.5*
50— 75	773	388	*50.2*
(75—108).....	(7)	(1)	*(14.3)*

5. Temperature and salinity at the spawning places.

These conditions have already been discussed (p. 16) in regard to the Herring; in addition to what has been noted there, the following may be said with reference to the requirements of the Sprat.

During the principal spawning period in April—May the temperature is about the same inside the fjords as in the open waters out round the islands; the difference is at any rate not greater than 0.5° C.; from the curve Fig. 10 we see, that the temperature on the spawning places of the Sprat lies in the interval $5^1/_2$°—8° C.

Inside the fjords the salinity lies about 35 ‰ or slightly lower at the time the Sprat spawns; as is well-known, however, the salinity has very little to do with the Sprat's choice of spawning place.

As one example, it may be mentioned, that the surface temperature and salinity in Sundene and Kollefjord on 30th April 1934, when a number of tiny fry were taken there, were 6.29°—6.54° C. and 34.38—34.97 ‰.

6. Rate of growth.

For the Sprat also we lack suitable material from the lightest period of the year for the Faroes; at that time we may assume, that the fry are able to a large extent to evade the apparatus. For this reason the following general summary of the average lengths of Sprat larvae during the different months is probably not of very great value.

Table 15. Average size of Sprat fry from the Faroes.

Month	Number	Average size in mm.
April	285	5.32
May	1221	7.13
June	5	13.00
July	8	18.13
August	13	16.77
September	33	25.12

I take this opportunity of thanking Mr. Helge Thomsen, Mrs. Inger Rosenberg and Mr. B. Jepsen for assistance in various ways during the carrying out of this work; also Dr. H. M. Kyle for the English translation.

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Resumé.

1. Both Herring and Sprat spawn at the Faroes. The Sprat is here at the extreme north-west of the distribution of the species.
2. Absence or presence of supracaudal pigment in the tiny larvae is of value for the separation of the two species.
3. Only the fry of the spring-spawning Herring have as yet been taken at the islands.
4. The young of the spring Herring is only present in small quantities at the Faroes (56 spec. per 1 hour's positive horizontal haul with 2 m. stramin net).
5. The spawning period of the spring Herring falls in (February?), March—May, chiefly in March; the temperature is then about 5°—7° C.
6. The principal spawning place of the Herring in the present period seems to lie on the east side of Suderø, within the 50 m. line approximately.
7. The strong current at the islands seems to have a strong influence on the distribution of the fry; probably a great many are carried right away from the area; in consequence, presumably, the local stock is but small.
8. The Sprat practically speaking only spawns in the fjords, especially in those round Sundene in the northern isles; in the present period very little spawning occurs in the fjords of Suderø.
9. As with the Herring the fry only occur in small quantities (71 specimens per haul of 1 hour).
10. The spawning period of the Sprat lies chiefly in the period from late in March till May. The temperature then lies about $5^1/_2$°—8° C.

Dansk Resumé.

1. Baade Silden og Brislingen gyder ved Færøerne. Den sidstnævnte findes her paa den nordvestligste Kant af Artens Udbredningsomraade.
2. Manglen eller Tilstedeværelsen af supracaudalt Pigment hos de smaa Larver er af Værdi ved Artsbestemmelsen af Larverne af de to Arter.
3. Der er endnu kun taget Yngel af den foraarsgydende Sild ved Øerne.
4. Den foraarsgydende Silds Yngel er kun til Stede i mindre Mængde ved Færøerne (56 Stkr. pr. positiv Times horisontale Træk med 2 m Straminnet).
5. Den foraarsgydende Silds Gydeperiode falder i (Februar?), Marts—Maj, hovedsagelig i Marts. Temperaturen ligger da omkring 5°—7° C.
6. Sildens vigtigste Gydeplads i nærværende Periode synes at ligge ved Østsiden af Suderø, indenfor ca. 50 Meter-Kurven.
7. Den stærke Strøm ved Øerne synes at have stor Indflydelse paa Spredningen af Ynglen, der antagelig for en Dels Vedkommende føres helt bort fra Omraadet, hvilket maa antages at være en vigtig Aarsag til, at den lokale Bestand kun er lille.
8. Brislingen findes praktisk talt kun ynglende i Fjordene, særlig i Fjordene omkring Sundene paa Nordøerne; meget lidt Gydning finder i nærværende Periode Sted i Fjordene paa Suderø.
9. Ynglen er ligesom Sildens kun til Stede i mindre Mængde (71 Stkr. pr. Times Træk).
10. Gydeperioden for Brislingen ligger særlig i Perioden fra sidst i Marts til Maj. Temperaturen ligger da omkring $5^1/_2$°—8° C.

List of Material.

Herring — *Clupea harengus.*

St.	Date Hour	Position N.	Position W.	Depth	Gear*) m. w.	Min.	7**)	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		Total number
1932			Funding Fjord																							
4396	$^{23}/_{6}$	8^{25}	62°14.7′	6°56.5′	23	20	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1/26	1
1933			Funding Fjord																							
4586	$^{26}/_{7}$	23^{00}	62°17.3′	6°56′	58	15	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1/47	1
1934			NW. of Suderø Bank																							
5025	$^{22}/_{4}$	8^{05}	61°42.5′	4°51′	215	15	15	—	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
„	„	„	„	„	„	65	„	—	—	9	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11
			W. of Troldhoved																							
5037	$^{25}/_{4}$	9^{50}	61°55′	7°08′	72	15	15	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	2
„	„	„	„	„	„	65	„	—	—	1	—	5	3	—	—	—	—	—	—	—	—	—	—	—	—	9
			W. of Troldhoved																							
5038	$^{25}/_{4}$	12^{05}	61°55′	7°30′	126	65	15	—	1	2	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6
			W. of Troldhoved																							
5040	„	17^{45}	61°55′	8°36′	240	15	15	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
„	„	„	„	„	„	65	„	—	—	2	4	3	3	—	—	—	—	—	—	—	—	—	—	—	—	12
			Off Myggenæs																							
5041	„	22^{25}	62°08′	7°50′	108	15	15	—	1	1	3	8	1	—	—	—	—	—	—	—	—	—	—	—	—	14
„	„	„	„	„	„	65	„	—	—	2	4	6	3	1	—	—	—	—	—	—	—	—	—	—	—	16
			N. of Djupene																							
5044	$^{26}/_{4}$	15^{05}	62°21′	6°53′	95	65	15	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
			Off Fuglø																							
5049	$^{27}/_{4}$	19^{25}	62°25′	6°12′	83	65	15	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
			Off Kalsø																							
5051	$^{28}/_{4}$	17^{45}	62°30′	6°50′	112	65	15	—	—	—	—	1	—	—	1	—	—	1	—	—	—	—	—	—	—	3
			Off Nolsø																							
5052	$^{29}/_{4}$	6^{15}	62°03′	6°27′	80	65	15	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
			Suderø Bank																							
5059	$^{1}/_{5}$	9^{10}	61°30′	5°40′	185	65	15	—	—	1	1	1	1	—	—	—	—	—	—	—	—	—	—	—	—	4
			Suderø Bank																							
5060	„	11^{50}	61°30′	6°05′	189	15	15	—	—	—	5	6	7	1	—	—	—	—	—	—	—	—	—	—	—	19
„	„	„	„	„	„	65	„	—	—	7	20	61	54	30	7	—	—	—	—	—	—	—	—	—	—	179
			E. of Suderø																							
5061	$^{1}/_{5}$	13^{45}	61°30′	6°22′	c. 215	15	15	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	2
„	„	„	„	„	„	65	„	—	—	—	3	8	8	2	—	—	—	—	—	—	—	—	—	—	—	21
			E. of Suderø																							
5062	„	15^{30}	61°31′	6°38.5′	79	15	15	—	—	—	3	—	—	1	—	—	—	—	—	—	—	—	—	—	—	4
„	„	„	„	„	„	65	„	—	—	3	8	2	—	—	—	—	—	—	—	—	—	—	—	—	—	13
			Vaag Fjord																							
5064	$^{2}/_{5}$	8^{40}	61°28.2′	6°47.2′	13	15	15	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
			Vaag Fjord																							
5065	„	9^{10}	61°27.8′	6°45′	41	10	15	—	—	—	—	1	3	3	1	—	—	—	—	—	—	—	—	—	—	8
„	„	„	„	„	„	40	„	—	—	—	—	4	5	3	—	—	—	—	—	—	—	—	—	—	—	12
			Vaag Fjord																							
5066	„	10^{20}	61°28.2′	6°43.5′	66	10	15	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
„	„	„	„	„	„	40	„	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	2

*) 2 m Stramin-net if not otherwise stated. **) Length in mm.

Herring — *Clupea harengus.*

St.	Date	Hour	Position N.	Position W.	Depth	Gear*) m. w.	Min.	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		Total number
1934																											
			Trangisvaag																								
5067	2/5	11[25]	61°32′	6°44.6′	40	10	15	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
„	„	„	„	„	„	40	„	—	—	1	5	4	4	2	—	1	—	—	—	—	—	—	—	—	—	—	17
			Trangisvaag																								
5068	„	12[20]	61°33.2′	6°48.3′	25	15	15	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
			Off Skaalhoved																								
5070	3/5	4[40]	61°50′	6°32′	c. 60	15	15	—	—	—	—	2	—	—	1	—	—	—	—	—	—	—	—	—	—	—	3
„	„	„	„	„	„	65	„	—	—	2	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	3
			Off Myling																								
5072	4/5	16[35]	62°21′	7°16′	95	65	15	—	—	—	—	—	3	2	1	—	—	—	—	—	—	—	—	—	—	—	6
			NW. of Myling																								
5073	„	19[00]	62°26′	7°36′	105	65	15	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
			W. of Suderø																								
5075	5/5	6[00]	61°33′	7°20′	150	65	15	—	—	—	2	—	3	1	—	—	—	—	—	—	—	—	—	—	—	—	6
			Off Fuglø																								
5149	25/5	21[25]	62°25′	6°12′	86	15	15	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	1	—	—	3
„	„	„	„	„	„	65	„	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
			Off Nolsø																								
5150	26/5	0[40]	62°03′	6°27′	74	15	15	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
„	„	„	„	„	„	65	„	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
			Nolsø Fjord																								
5151	„	13[40]	61°58′	6°41′	74	65	15	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
			Suderø Bank																								
5154	27/5	1[25]	61°30′	5°40′	180	15	15	—	—	—	3	13	36	69	43	20	14	6	5	6	2	2	—	—	—	1/?	220
„	„	„	„	„	„	65	„	—	—	—	2	5	13	23	20	8	7	2	3	—	2	—	—	—	—	9/?	94
			Suderø Bank																								
5155	„	4[20]	61°30′	6°05′	190	15	15	—	—	—	—	—	—	1	3	3	2	1	—	—	—	—	—	—	—	—	10
„	„	„	„	„	„	65	„	—	—	—	—	—	—	7	5	4	5	5	3	2	—	—	—	—	—	2/?	33
			W. of Troldhoved																								
5157	„	12[45]	61°55′	7°08′	c. 70	15	15	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1
„	„	„	„	„	„	65	„	—	—	—	—	—	1	—	—	—	1	1	1	—	—	—	—	—	—	—	4
			Trangisvaag																								
5160	28/5	7[05]	61°32′	6°44.6′	47	15	15	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
„	„	„	„	„	„	65	„	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
			Vaag Fjord																								
5164	„	10[20]	61°28.2′	6°47.5′	14	15	15	—	—	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	2
			S. of Suderø																								
5166	„	21[10]	61°21.5′	6°40′	60	15	15	—	—	—	1	—	2	—	4	1	1	—	1	—	1	—	—	—	—	—	11
„	„	„	„	„	„	65	„	—	—	—	—	—	1	1	5	4	3	—	1	—	1	1	—	—	—	—	17
			S. of Suderø																								
5167	„	23[00]	61°12′	6°40′	125	15	15	—	—	—	—	—	—	—	—	—	2	2	1	2	—	4	1	—	—	—	12
„	„	„	„	„	„	65	„	—	—	—	—	—	—	—	—	—	—	—	1	3	1	—	—	—	—	—	5
			Djupene																								
5168	30/5	6[40]	62°21′	6°53′	98	15	15	—	—	—	—	—	—	—	—	3	2	—	3	—	—	—	—	—	—	—	8
„	„	„	„	„	„	65	„	—	—	—	—	—	—	—	—	1	1	—	2	1	—	1	—	—	—	—	6
			Off Myling																								
5169	„	9[15]	62°21′	7°16′	100	15	15	—	—	—	—	—	—	—	—	—	—	4	2	2	1	—	—	—	—	—	9
„	„	„	„	„	„	65	„	—	—	—	—	—	—	—	1	1	1	—	1	2	1	—	—	—	—	—	7
			Off Myling																								
5170	„	11[20]	62°26′	7°36′	97	65	15	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1

*) 2 m Stramin-net if not otherwise stated.

Herring — *Clupea harengus.*

St.	Date Hour	Position N.	Position W.	Depth	Gear*) m. w.	Min.	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		Total number
1934																										
		Skaalefjord																								
5174	$^{30}/_{5}$ 23^{55}	62°07′	6°44′	69	65	15													–	1	1	—	—	—	—	2
		Off Myling																								
5281	$^{9}/_{7}$ 15^{20}	62°21′	7°16′	97	15	15			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1/32	1
1935																										
		Trangisvaag																								
5302	$^{27}/_{3}$ 17^{10}	61°32′	6°44.5′	c. 45	50	15	1	5	7	7	2	—	—	—	—	—	—	—	—	—	—	—	—	—	1/?	23
		Vaag Fjord																								
5303	„ 18^{00}	61°28.2′	6°42.5′	c. 50	65	15	2	12	6	7	5	4	—	—	—	—	—	—	—	—	—	—	—	—	—	36
		Suderø Bank																								
5304	$^{28}/_{3}$ 9^{35}	61°30′	6°05′	c. 190	65	15	—	1	1	4	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8
		Suderø Bank																								
5305	„ 11^{30}	61°30′	5°40′	180	65	15	–	—	3	2	1	3	—	—	—	—	—	—	—	—	—	—	—	—	—	9
		E. of Suderø																								
5306	„ 14^{00}	61°30′	6°22′	c. 215	65	15	–	1	4	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7
		Lervig Fjord																								
5314	$^{1}/_{4}$ 15^{45}	62°13′	6°40′	c. 88	15	15	—	—	—	—	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	3

*) 2 m Stramin-net if not otherwise stated.

Sprat — *Clupea sprattus.*

St.	Date Hour	Position N.	Position W.	Depth	Gear m. w.	Min.	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		Total number
1924																														
		Trangisvaag																												
2702	$^{26}/_{5}$ 15^{00}	61°33.3′	6°49.2′	35	15	30	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
		Kollefjord																												
2081	$^{31}/_{5}$ 11^{30}	62°06′	6°54.8′	23	20*)	30	—	9	20	42	27	21	8	1	3	—	—	—	—	—	—	—	—	—	—	—	—	—		131
		Off Skaalefjord																												
2234	$^{2}/_{8}$ 17^{20}	62°07′	6°44′	66	65	5	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1
		Skaalefjord																												
2235	$^{2}/_{8}$ 19^{15}	62°04.5′	6°46′	74	65	15	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1
		Trangisvaag																												
2242	$^{3}/_{8}$ 18^{10}	61°33.2′	6°48.3′	c.23	10	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
		Sundene																												
2250	$^{9}/_{8}$ 16^{50}	62°09.3′	6°55.2′	47	20*)	30	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1
1925																														
		Kollefjord																												
2281	$^{20}/_{5}$ 8^{35}	62°06.7′	6°53′	c.35	20	30	—	—	6	6	3	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	18
		Off Skaalefjord																												
2282	$^{20}/_{5}$ 10^{40}	62°04.5′	6°46′	72	15	30	2	30	44	23	11	8	4	5	2	—	1	—	—	—	—	—	—	—	—	—	—	—	—	130
„	„ 10^{00}	„	„	„	65	30	—	4	80	147	78	22	12	7	2	2	—	—	—	—	—	—	—	—	—	—	—	—	8/?	362
		Skaalefjord																												
2283	$^{20}/_{5}$ 12^{45}	62°07′	6°44′	70	15	30	—	2	9	9	6	3	5	6	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	42
„	„ 12^{10}	„	„	„	65	30	—	1	4	11	16	21	26	12	6	7	—	—	—	—	—	—	—	—	—	—	—	—	—	104

*) Petersen Young Fish Trawl.

Sprat — *Clupea sprattus*.

St.	Date Hour	Position N. W.	Depth	Gear m. w.	Min.	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		Total number
1925																													
		Skaalefjord																											
2284	$^{20}/_{5}$ 14^{00}	62°09.5′ 6°45.2′	66	65	30	—	—	—	—	1	—	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1/?	4
		Skaalefjord																											
2285	$^{20}/_{5}$ 16^{30}	62°11.3′ 6°49.1′	25	15	30	—	5	29	22	15	10	5	6	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	94
„	„ 15^{55}	„ „	„	50	30	—	4	32	33	39	28	22	19	4	1	—	—	—	—	—	—	—	—	—	—	—	—	—	182
		Trangisvaag																											
2288	$^{21}/_{5}$ 15^{55}	61°33.2′ 6°48.3′	23	10	15	—	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
		Trangisvaag																											
2289	$^{21}/_{5}$ 16^{30}	61°33.3′ 6°49.2′	19	20	30	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
		Vaag Fjord																											
2481	$^{19}/_{8}$ 17^{30}	61°27.8′ 6°45′	43	10	15	—	—	—	1	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
1926																													
		Skaalefjord																											
2531	$^{26}/_{5}$ 10^{55}	62°07′ 6°44′	70	15	15	—	—	—	—	—	—	5	3	5	7	6	5	2	—	—	—	—	—	—	—	—	—	—	33
„	„ „	„ „	„	65	„	—	—	—	2	6	7	7	13	7	3	2	2	—	—	—	—	—	—	—	—	—	—	—	49
		Off Skaalefjord																											
2534	„ 14^{20}	62°04.5′ 6°46′	70	15	30	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
„	„ „	„ „	„	65	„	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
		Sundene																											
2542	$^{28}/_{5}$ 7^{20}	62°11.2′ 6°58.5′	26	20	15	—	—	—	—	—	—	—	1	1	2	1	—	—	—	—	—	—	—	—	—	—	—	—	5
		Sundene																											
2543	„ 8^{25}	62°09.4′ 6°55.3′	57	20	15	—	—	—	—	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	2
		Sundene																											
2544	„ 10^{45}	62°06.2′ 6°48.7′	70	20	15	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
		Trangisvaag																											
2552	$^{31}/_{5}$ 11^{20}	61°33.2′ 6°48.3′	25	20	15	—	—	—	—	—	1	1	2	—	—	1	1	—	—	1	—	—	—	—	—	—	—	—	7
		Trangisvaag																											
2553	„ 10^{55}	61°33.3′ 6°49′	12	20	15	—	—	—	—	3	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	5
		Trangisvaag																											
2557	„ 12^{45}	61°32.5′ 6°47′	32	10	30	1	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
2990	$^{8}/_{8}$ 9^{45}	„ „	34	40	30	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1
1927																													
		Vaag Fjord																											
3015	$^{20}/_{6}$ 15^{15}	61°27.8′ 6°45′	44	40	15	—	—	—	—	—	—	—	—	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	2
		Skaalefjord																										2/25	
3048	$^{29}/_{6}$ 11^{00}	62°09.5′ 6°45.2′	65	65	15	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	3/26	2
		Trangisvaag																										2/27	
3336	$^{3}/_{9}$ 5^{10}	61°33.3′ 6°49.2′	18	20	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	7	3/28	19
																												2/25	
		Trangisvaag																										1/27	
3337	„ 5^{45}	61°33.2′ 6°48.3′	28	20	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2	4	1	1/28	14
																												1/29	
																												1/35	
1932																													
		Funding Fjord																											
4396	$^{23}/_{6}$ 8^{25}	62°14.7′ 6°56.5′	23	20	15	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
		Trangisvaag																											
4502	$^{5}/_{8}$ 7^{00}	61°32.5′ 6°47′	34	10	15	—	—	—	—	—	—	—	—	—	—	—	1	—	—	2	1	—	2	—	—	—	—	—	6

St.	Date	Hour	Position N.	Position W.	Depth	Gear m. w.	Min.	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		Total number
1934																															
			Skaalefjord																												
5033	24/4	16[40]	62°07′	6°44′	70	65	15	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
			Skaalefjord																												
5035	25/4	5[10]	62°11.5′	6°49.3′	19	15	15	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
			Off Myggenæs																												
5041	„	22[35]	62°08′	7°50′	108	15	15	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
			Sundene																												
5055	30/4	8[00]	62°11.2′	6°58.3′	27	20	15	5	14	31	6	5	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	64
			Sundene																												
5056	„	8[30]	62°09.4′	6°55.3′	45	15	15	—	5	33	11	6	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	58
„	„	„	„	„	„	65	„	3	15	49	6	12	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6/?	97
			Kollefjord																												
5057	„	10[10]	62°06.8′	6°52′	43	15	15	—	1	12	1	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	16
„	„	„	„	„	„	65	„	—	10	7	6	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1/?	29
			Kollefjord																												
5153	26/5	16[15]	62°06.8′	6°52′	42	15	15	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
„	„	„	„	„	„	65	„	—	—	2	2	3	1	5	3	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	18
			Trangisvaag																												
5159	28/5	6[10]	61°33.2′	6°48.3′	28	15	15	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
			Vaag Fjord																												
5163	„	9[35]	61°27.8′	6°45′	43	15	15	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
			Vaag Fjord																												
5164	„	10[20]	61°28.2′	6°47.5′	14	15	15	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
			Sundene																												
5173	30/5	22[35]	62°09.4′	6°55.3′	44	65	15	—	—	—	—	—	1	1	2	2	4	1	1	—	—	—	—	—	—	—	—	—	—	—	12
			Skaalefjord																												
5174	„	23[55]	62°07′	6°44′	69	15	15	—	—	—	—	1	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	3
„	„	„	„	„	„	65	„	—	—	—	1	1	2	1	3	3	—	1	—	—	—	—	—	—	—	—	—	—	—	12
			Sundene																												
5255	5/7	7[35]	62°09.4′	6°55.3′	40	15	15	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	1	—	—	—	—	—	—	—	3
			Off Skaalefjord																												
5257	„	9[45]	62°04.5′	6°46′	77	15	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	—	—	2
„	„	„	„	„	„	65	„	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	2
			Vaag Fjord																												
5270	7/7	19[15]	61°28.2′	6°47.2′	c.14	15	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1
1935																															
			Götevig																												
5310	1/4	12[55]	62°30.5′	6°40.5′	c.50	65	15	—	8	3	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12
			Off Lervig																												
5311	„	13[45]	62°12.8′	6°41′	c.50	65	15	—	—	—	1	2	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5
			Fuglefjord																												
5312	„	14[30]	62°13.5′	6°46′	c.50	15	15	—	—	1	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4
			Fuglefjord																												
5313	„	15[15]	62°13.5′	6°46′	c.50	15	15	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
			Lervig Fjord																												
5315	„	16[30]	62°13′	6°40′	c.88	15	15	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2

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